

REMARKS

This is in full and timely response to the above-identified Office Action. The above listing of the claims supersedes any previous listing. Favorable reexamination and reconsideration are respectfully requested in view of the preceding amendments and the following remarks.

Claim amendments and Status

In this response, claim 25 is cancelled, new claims 28 to 31 are added, and claims 14-17, 19-20 and 26 are amended to clarify the subject matter for which patent protection is sought and to overcome the 35 USC § 112 first and second paragraph rejections. Support for the newly added claims is found in the originally filed specification and claims and are patentable over the art for at least the reasons that they set forth subject matter which is neither disclosed in nor rendered obvious by the cited art.

Claims 1-25 and 26-31 are therefore pending in the application.

Rejections under 35 USC § 112

The claimed subject matter relates to a laser active optronic system with improved detectivity, comprising an optical switch which comprises an optical gain medium in a receiving channel, and a pumping means for the gain medium. The pumping of the gain medium is controlled in order to enable the transmission of a laser beam, when activated, by rendering the gain medium optically transparent; or to block transmission, when the pumping is not activated, by rendering the gain medium optically absorbent.

The time-variable activation of the pumping enables the control of the transmission in a chosen temporal window. In other words, an optical gate is obtained, which when open – when the gain medium is pumped to become transparent - is timely controlled. This timely controlled optical gate enables the system to be protected against retro-diffusion effects, with easy adaptation to the distance of the target, and with a very short response time.

In addition, as an extra advantageous effect, the pumping rate may be determined so to obtain an amplification effect.

In connection with the issues raised under 35 USC § 112, in paragraph 3 of the office action, independent claim 14 does not concern amplification, but transmission by an optical gate, formed by an optical gain medium, and controlled pumping means. Amplification is a supplemental, advantageous characteristic. See the instant specification at page 5, lines 13-14.

Claim 17 depends from claim 14. For this reason at least, the objection raised by the examiner is traversed. However, it is proposed to amend claim 17, by calling for amplification of the backscattered wave to be absent when the optical switching device is in an ON mode.

In addition, the person of skill in the instant art is aware that it is possible with a semiconductor compound to use the wavelength of the target-illuminating beam to render a semiconductor wafer transparent, by filling of the conducting band, and by screening the excitonic states in quantum wells structures.

Claim 19 has been amended to depend from claim 16, so that the rejection under 35 USC § 112, is rendered moot.

Rejections under 35 USC § 103

The rejection of:

- 1) Claims 14-19 and 25 under 35 USC §103(a) as being unpatentable over Maillet (US 4,197,006) in view of Duguay (US 3,521,070);
- 2) Claims 21-24 under 35 USC §103(a) as being unpatentable over Maillet (US 4,197,006) in view of Duguay (US 3,521,070), as applied to claim 14 above, and further in view of Mace et al. (US 5,454,058);
- 3) Claim 26 under 35 USC §103(a) as being unpatentable over Maillet (US 4,197,006) in view of Duguay (US 3,521,070), as applied to claim 14 above, and further in view of Mace et al. (US 5,454,058); and
- 4) Claims 20 and 27 under 35 USC §103(a) as being unpatentable over Maillet (US 4,197,006) in view of Duguay (US 3,521,070), as applied to claim 14 above, and further in view of Lawandy (US 5,448,582);

are, to the degree that they still pertain to the claims as amended *supra*, are summarily traversed

It is submitted that the subject matter of claim 14 is not specifically directed to an amplifying arrangement but to an optical gate, with ON and OFF states, determined by controlled transparency of an optical gain medium. In one embodiment ions of rare earths, typically erbium ions are used. In another embodiment of the invention, semiconductors compounds are used.

The amplification effect is an additional characteristic in both embodiments. However, it is submitted that it is not necessary, but an attendant advantage, to have this amplification, as an extra effect. In at least one embodiment it is obtained by selecting an appropriate pumping rate.

Maillet (US 4 197 006) describes a method to protect a reception system from retro-diffusion effects, or more exactly from a laser threat (counter-measure laser pulses), by means of an electrically controlled mechanical cache (18, 20, 24, 28).

An important difference between the claimed subject matter and the arrangement disclosed in Maillet is that the masking function is obtained by means of an optical gate, with a gain medium which pumping control enables the control of the aperture of the optical gate in a desired time-window, or desired time-windows. The claimed subject matter an advantage over Maillet in that short response time is enabled, enabling both tomographic operation on metric distances. In addition, optical amplification can be obtained as noted above.

The teaching of Maillet does not anticipate the invention as currently claimed.

Dugay (US 3 521 070) discloses an encoder which uses an optical gate, the operational mode of which is quite different than the one of the invention.

In Dugay, and with reference to Figures 2A and 2B of Dugay, and passages of the description col. 2, line 58 - col. 3 lines 60, the principle disclosed consists of exciting an atomic transition by means of a picosecond gate pulse, and to bring the signal wave up to an absorption band. It should be noted that we can speak of absorption on an excited state.

It is submitted that this is completely different from the scheme used in the claimed invention as detailed further below, in relation with figure A.

In addition, Dugay, needs the use of an ultra-short pulse source which must be in synchronism with the pulse train of the information signal to code. More precisely, Dugay describes a system to optically control absorption, for encoding, and the process to optically control absorption operates in a manner which is complete opposite to the process via which the transmission of the gain medium is optically controlled in accordance with the claimed invention.

In Dugay, the system consists in exciting an atomic transition by a picosecond pulse, then to bring the signal wave towards an absorption band : this is referred to as "absorption on excited state"

This effect is clearly shown on Figures 2A and 2B, the "absorption of a signal at frequency f occurs if electrons are excited by that signal from the ground state S_1 to an allowed energy level", which energy levels are S_2, S_3 , greater than S_1 ."

In the claimed invention, the process is exactly the opposite, and this not insignificant as regards the very short switching times to be obtained, and the functionality and purpose of the system.

Indeed, the optical gain medium in the claimed invention is absorbent while not pumped, and transparent while pumped, so that a blind zone may be controlled at the start of emission of laser beam until a predetermined instant corresponding to the distance of the target. In addition, detection windows may thus be controlled, enabling detection at variable distances.

Further, in Dugay, there is a need for the use of an ultra-short pulse source, which must be in synchronism with the pulse train of the information signal to code.

For at least the above reasons, Dugay does not anticipate an optical switch equivalent to the one used in the invention. Further, there is no motivation or incitation to use the encoder of Dugay in place of the mechanical cache of Maillet. In particular, the mode of operation of the encoder of Dugay does not enable to obtain the function of the mechanical cache of Maillet.

It is therefore submitted that the subject matter of claim 14 is patentable over Dugay in view of Maillet.

It is further submitted that claim 26 is not anticipated by the cited art.

Claim 26 addresses an optical gain medium incorporating erbium ions, and exhibiting a three level state medium which has the transmission properties illustrated in the annexed figure (FIG A). That is to say, without pumping, the erbium ions remain in a non-excited state and the medium assumes an absorbent condition, all the more absorbent when the doping is high. That means that the erbium ions are on the fundamental level 1, on the figure, which is the level $^4I_{15/2}$ for Erbium ions.

Now, when the control unit actuates the pumping means, part of the Erbium ions are carried towards an excited level 3, the state $^4I_{11/2}$ of the Erbium ions, which relaxes down to a metastable level 2, which is a level with a great fluorescence lifetime. This is the level $^4I_{13/2}$ for the erbium ions. By this, the density of active erbium ions diminishes in the fundamental level 1, thus, absorption diminishes.

The pumping rate is adjusted by the control unit, so that populations in the fundamental state 1 and the metastable state 2 are identical, thus obtaining transparency.

An improvement consists in further increasing the pumping rate, so that a population inversion function is achieved between the fundamental state and the metastable state, the latter being the most populated, so that amplification is obtained according to a stimulated emission process.

It is this particular mode of operation of the optical gain medium of the invention which is used in the claimed invention in order to realize the switching function of light transmission in the receiving channel.

Such a mode of operation of an optical gain medium is neither known nor suggested in Dugay.

Thus it is submitted that there is nothing that would lead one of ordinary skill to take teachings from Dugay and apply them to Maillet inasmuch as Maillet discloses a mechanical switching device which could derive no obvious benefit from the teachings of Dugay.

As to the claims regarding the use of a semiconductor material, the previous arguments regarding claim 14, applies in the same way.

In addition, it is observed that Mace et al. (US 5 454 058) discloses an optical component with first light guiding path optically connected to a second light guiding path and a third light guiding path, with first light amplification zone extending continuously through or beneath at least a portion of both said first and second light guiding path and second light amplification zone extending continuously through or beneath at least a portion of both said first and third light guiding.

Thus, Mace et al teaches amplification means. Further, attention is called to the indication at column 2, line 63 to column 3, line 2, that:

we have discovered that by providing amplification associated with either the first and the second light guiding paths or the first and the third light guiding paths, an enhanced crosstalk characteristic less than -30dB is obtained. This, we believe, is because optical absorption in the light guiding path which lacks amplification is high, whereas in the other light guiding path there is optical gain.

Thus Mace et al. needs amplification and is based on amplification.

With the claimed invention however, the main basis function is an optical switch acting like an optical gate : that is on or off, not for amplification means. The amplification is only an extra effect, obtained by adjusting the pumping rate.

The above listed rejections are therefore respectfully traversed.

Information Disclosure Statement

In this Office Action, it is stated that the Information Disclosure Statement filed June 12, 2006 fails to comply with 37 CFR 1.98(a)(2). In response, a complete copy of each cited foreign patent document is attached herewith. It is respectfully requested that the Examiner initial the form 1449 and return same to Applicant.

Conclusion

All objections and rejections having been addressed, it is respectfully submitted that the present application should be in condition for allowance and a Notice to that effect is earnestly solicited.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 07-1337 and please credit any excess fees to such deposit account.

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